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THE ALPINE FLORA OF COLORADO

T. D. A. COCKERELL

In 1881 (*Bull. U. S. Geol. and Geogr. Surv. Terr.*, vol. 6, no. 1) Gray and Hooker gave a list of the alpine plants of the Rocky Mountains: 184 species, of which 102 extended to the arctic or subarctic regions. Since that time, our knowledge has greatly increased, but the records have been scattered in many publications, and no summary has been available. The appearance of a new Flora of Colorado, written by Dr. P. A. Rydberg and issued by the Colorado Agricultural Experiment Station (*Bulletin 100*, 1906) makes it possible to gather together the known facts, so far as they relate to that State, and derive from them some general conclusions.

It is not pretended, of course, that the information given by Rydberg is complete; and it must doubtless be admitted that some of the recently described species probably do not deserve that rank; but allowing for these and other elements of doubt and difficulty, we may still recognize many broad facts which are not likely to be overthrown. With regard to the details, each statement may be regarded as a challenge to Colorado botanists, to refute it if they can, and in this way even error may be made the cause of progress. The Arctic-Alpine Zone begins at timber line, or the upper limit of trees. This may be roughly placed at an altitude of 12,500 feet, but it differs according to the character of the exposure as well as the latitude, and may actually descend considerably lower. In order to omit nothing, I listed all the plants given by Rydberg as growing at 12,000 feet or above: 386 species. Of these, 202 are not recorded as going above 12,500 feet, and may therefore not pass beyond the Hudsonian Zone; 92 of the 386 descend to below 8000 feet, and of these, 62 do not go above 12,500 feet.

Old World Species

Forty-eight species (probably more!) extend to the Old World, most of them being circumpolar, but a few only reaching eastern Asia. I have divided these into four groups:—

(1) Going above 12,500 feet, and not below 11,000 (10 species): —

Carex incurva Lightf.
C. atrata L.
C. pyrenaica Wahl.
C. rupestris All.
C. microglochin Wahl.
Papaver radicatum Rottb.
Saxifraga cernua L.
Dryas octopetala L.
Dasystephana romanzovii (Ledeb.)
Sagina nivalis Fries.[1]

(2) Going above 12,500, but also below 11,000 feet (16 species): —

Filix fragilis (L.).
Trisetum subspicatum (L.).
Poa alpina L.
Elyna bellardi (All.).
Carex nigricans C. A. Mey. (to Asia).
Juncoides spicatum (L.).
Lloydia serotina (L.).
Oxyria digyna (L.).
Silene acaulis L.
Draba aurea Wahl.
Muscaria adscendens (L.).
Leptasea flagellaris (Willd.).
Potentilla nivea L.
Sibbaldia procumbens L.
Campanula uniflora L.
Erigeron uniflorus L.

(3) Not going above 12,500 or below 11,000 feet (3 species):—

Botrychium lunaria (L.).
Carex misandra R. Br.
Aster alpinus L.

(4) Not going above 12,500, but going below 11,000 feet (19 species):—

Phleum alpinum L.
Festuca pseudovina Hackel.
Carex nardina Fries.
C. alpina Sw.
C. capillaris L.
Lemna gibba L.
Juncus castaneus Smith.
Vagnera stellata (L.).
Bistorta vivipara (L.).
Ranunculus affinis R. Br. (to Asia).
Thalictrum alpinum L.
Epilobium anagallidifolium Lam.
Moneses uniflora (L.).
Pyrola secunda L.
P. minor L.
P. uliginosa Torrey (to Japan).
P. chlorantha Schwartz.
Utricularia vulgaris L.
Adoxa moschatellina L.

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[1] In addition, *Alsine baicalensis* and *A. læta* are said to occur in Asia.

Muscaria adscendens (L.), according to Nelson, is different from our plant; in this case the latter must be removed from the circumpolar list, and will bear the name *Muscaria oregonensis* (*Ponista oregonensis* Raf., 1836).

It will be seen that of the Old World species, 26 go above 12,500 feet, and 13 do not go below 11,000. Seven, however, go below 8000. Admitting that the figures are only rough and approximate, it still comes out quite clearly that the circumpolar flora, while of course boreal, is not especially arctic-alpine. The most characteristic arctic plant is no doubt the Papaver, which seems curiously out of place in our flora.

Out of the 48 the following occur in the British Islands, which are neither arctic nor greatly elevated: —

Botrychium lunaria (L.).
Filix fragilis (L.).
Phleum alpinum L.
Poa alpina L.
Carex incurva Lightf.
C. alpina Sw.
C. atrata L.
C. rupestris All.
C. capillaris L.
Lemna gibba L.
Juncus castaneus Smith.
Juncoides spicatum (L.).
Oxyria digyna (L.).
Bistorta vivipara (L.).
Silene acaulis L.
Thalictrum alpinum L.
Saxifraga cernua L.
Dryas octopetala L.
Sibbaldia procumbens L.
Epilobium anagallidifolium Lam.
Pyrola secunda L.
P. minor L.
Utricularia vulgaris L.
Adoxa moschatellina L.
Sagina nivalis Fries.

Species Which go above 12,500 Feet, but are Confined to America

(1) Species which extend to British America or Alaska
  (*a*) Species not reported below 11,000 feet (7 species): —

Poa arctica R. Br.
Salix petrophila Rydb.
Alsinopsis rossii (Richards).
A. quadrivalvis (R. Br.).
Ranunculus eschscholtzii Schl.
Draba fladnizensis Wulf.
Castilleja occidentalis Torrey.

Castilleja tincta (*C. pallida occidentalis tincta* Ckll., *Bull. Torr. Bot. Club*, 1890, p. 36) is doubtless a hybrid between *occidentalis* and *haydeni*.

(*b*) Species going below 11,000 feet (31 species):—

Deschampsia alpicola Rydb.
Poa crocata Mich. (Goes below 8000.)
Festuca brachyphylla Schultes.
Carex festiva Dewey. (Down to 6500.)
C. petasata Dewey.
Juncus drummondii Mey.
Salix glaucops Anders. (Down to 7000.)
Alsinopsis propinqua (Richards).
A. obtusiloba Rydb.
Androsace carinata Torrey.
Anthopogon elegans (A. Nelson).
Phacelia sericea Hook.
Castilleja rhexifolia Rydb. (Down to 7000.)
Solidago ciliosa Greene.
Antennaria media Greene.
Draba crassifolia Graham.
Rhodiola integrifolia Raf.
Heuchera parvifolia Nutt.
Muscaria delicatula Small.
Leptasea austromontana (Wieg.). (Down to 6000.)
Potentilla quinquefolia Rydb.
P. dissecta Pursh.
P. uniflora Ledeb.
P. rubripes Rydb.
Atelophragma elegans (Hook.). (Down to 7000.)
Linnæa americana Forbes.
Arnica parryi A. Gray.
Senecio columbianus Greene. (Down to 5000.)
S. purshianus Nutt. (Down to 6000.)
Agoseris aurantiaca (Hook.). (Down to 6000.)
Taraxacum scopulorum (Gray).

The two species of Alsinopsis are modifications of well known circumpolar types. *A. propinqua* has been considered identical with *Alsinopsis hirta* (*Arenaria hirta* Wormsk.), which has itself been placed as a variety of *Alsinopsis verna* (*Arenaria verna* L.). *A. obtusiloba,* which my wife obtained in abundance on Arapahoe Peak, Colo., on Sept. 1 of the present year, is a segregate from *Alsinopsis sajanensis* (*Arenaria sajanensis* Willd.). *Sedum stenopetalum* Pursh, is given by Rydberg as only up to 12,000; but my wife found it far above timber line on Arapahoe Peak.

(2) Species which do not extend beyond the United States.

(*a*) Species not reported below 11,000 feet (35 species):—

Avena mortoniana Scribn. (Colo. only.)
Poa pudica Rydb. (Colo. only.)
P. alpicola Nash.
P. rupicola Nash.
P. grayana Vasey. (Colo. and Wyo. only.)
P. lettermannii Vasey. (Colo. and Wyo. only.)
Carex elynoides Holm. (Colo. only.)
Allium pikeanum Rydb. (Colo. only.)
Eriogonum aureum Nutt. (Colo. only.)
E. xanthum Small. (Colo. only.)
Paronychia pulvinata A. Gray.
Cerastium pulchellum Rydb. (Colo. only.)

Ranunculus ocreatus Greene. (Colo. only.)
Smelowskia lineariloba Rydb. (Colo. only.)
Erysimum nivale (Greene).
Draba chrysantha S. Wats. (Colo. and N. M. only.)
D. streptocarpa grayana Rydb. (Colo. only.)
D. decumbens Rydb. (Colo. only.)
Leptasea chrysantha A. Gray. (Colo. and N. M.)
Oreoxis humilis Raf.
Phlox condensata (A. Gray). (Colo. and N. M.)
Polemonium speciosum Rydb.
Eritrichium argenteum Wight.
Mertensia bakeri Greene. (Colo. only.)
M. alpina (Torrey). (Colo. only.)
Chionophila jamesii Benth. (Colo. and So. Wyo.)
Chrysopsis alpicola Rydb. (Colo. and Wyo.)
Antennaria sierræ-blancæ Rydb. (Colo. only.)
Artemisia scopulorum A. Gray.
A. monocephala (A. Gray). (Colo. only.)
A. saxicola Rydb. (Colo. and Wyo.)
Senecio soldanella A. Gray. (Colo. only.)
S. petrocallis Greene. (Colo. only.)
S. porteri Greene. (Colo. only.)
Carduus hesperius (Eastw.). (Colo. only.)

Of all these, certainly the most remarkable is the Chionophila. The large number of endemic alpine species is especially noteworthy. The earliest name for the dwarf alpine Erysimum is *E. asperum nanum* Ckll., (*Nature Notes*, 1891, p. 15). Above timber line on the Truchas Peaks of northern New Mexico is another endemic Mertensia, *M. cælestina* Nels. & Ckll.

(*b*) Species going below 11,000 feet (78 species):—

Poa reflexa V. & S.
P. pattersonii Vasey. (Colo., Ariz.)
P. epilis Scribn.
Agropyron scribneri Vasey.
Carex chalciolepis Holm. (Colo. only.)
Juncus parryi Engelm.
Salix pseudolapponum Seem. (Colo. only.)
S. saximontana Rydb.
Claytonia megarrhiza Parry.
Alsine baicalensis Coville (to Asia?)
Clementsia rhodantha (A. Gray).
Rhodiola polygama Rydb. (Colo., N. M.)
Telesonix jamesii (Torrey). (Colo. only.)
Saxifraga debilis Engelm.
S. simulata Small.
Spatularia vreelandii Small.
Trifolium nanum Torrey.
T. dasyphyllum Torrey. (Down to 7000.)
T. parryi A. Gray.
Sidalcea candida A. Gray. (Down to 7000.)
Epilolium ovatifolium Rydb.
Oreoxis bakeri C. & R. (Colo. only.)
Angelica grayi C. & R. (Colo. and So. Wyo.)
Primula angustifolia Torrey. (Colo. and N. M.)
P. parryi A. Gray. (Properly Hudsonian Zone.)

Swertia palustris A. Nels.
Phlox scleranthifolia Rydb.
P. cæspitosa Nutt.
Gilia pinnatifida Nutt. (Down to 4000.)
Polemonium scopulinum Greene. (Colo. only.)
P. grayianum Rydb. (Colo. only.)
P. confertum A. Gray. (Wyo., Colo.)
Bistorta bistortoides (Pursh.). (Down to 7000.)
Paronychia diffusa A. Nels. (Down to 5000.)
Arenaria fendleri A. Gray. (Down to 7000.)
A. fendleri porteri Rydb. (Down to 7000.)
Delphinium barbeyi Huth.
D. alpestre Rydb. (Colo. only.)
Anemone zephyra A. Nels.
Thlaspi glaucum A. Nels.
Erysimum radicum Rydb. (Colo. only.)
E. amœnum (Greene.) (Colo. only.)
Draba parryi Rydb. (Colo., Wyo).
D. streptocarpa A. Gray. (Down to 6000.)
Potentilla minutifolia Rydb. (Colo. only.)
P. tenerrima Rydb. (Colo. only.)
P. saximontana Rydb. (Colo. only.)
Acomastylis turbinata (Rydb.).
Pentstemon hallii A. Gray. (Colo. only.)
P. harbourii A. Gray. (Colo. only.)
Besseya alpina (A. Gray.)
B. plantaginea Benth. (Down to 6000.)
Pedicularis grayi A. Nels.
P. scopulorum A. Gray. (Colo. only.)
Valeriana acutiloba Rydb.
Chrysothamnus pinifolius Greene. (Down to 7000; is 13,000 perhaps erroneous?)
Tonestus pygmœus T. & G.
Solidago decumbens Greene. (Wyo. and Colo.)
Townsendia rothrockii Gray.
Machœranthera pattersonii (Gray). (Colo. only.)
Aster andinus Nutt. (? Below 11,000.)
Erigeron pinnatisectus (Gray).
Antennaria umbrinella Rydb. (Down to 7500.)
A. viscidula A. Nels. (Wyo. and Colo.)
Tetraneuris lanata (Nutt.). (Down to 6000.)
Rydbergia grandiflora (T. & G.)
R. brandegei (A. Gray). (Colo. and N. M.)
Senecio amplectens A. Gray. (Colo. only.)
S. holmii Greene. (Colo. only.)
S. taraxacoides (A. Gray). (Colo. only.)
S. carthamoides Greene. (Colo. and Wyo.)
S. crassulus A. Gray.
S. atratus Greene. (Colo. only; down to 7500.)
S. harbourii Rydb. (Colo. only.)
S. rosulatus Rydb. (Colo. only; down to 5000.)
S. fendleri A. Gray.
S. crocatus Rydb. (Wyo. and Colo.)
Agoseris maculata Rydb. (Colo. only.)

Sidalcea candida is typical of the Canadian Zone; I have never seen it at timber line or above.

Species not Reported above 12,500 Feet nor below 11,000

(1) Species which extend to British America or Alaska (3 species):—

Draba cana Rydb.
Artemisia spithamœa Pursh.
Carduus hookerianus (Nutt.).

(2) Species which do not extend beyond the United States (19 species):—

Deschampsia curtifolia Scribn.
Poa phœnicea Rydb. (Colo. only.)
Carex chimaphila Holm. (Colo. only.)
C. engelmannii Bailey. (Colo. only.)
Arenaria tweedyi Rydb.
Draba graminea Greene. (Colo. only.)
Micranthes brachypus Small.
Trifolium salictorum Greene. (Colo. only.)
Swertia congesta A. Nels.
Gilia cephaloidea Rydb.
Eritrichium elongatum (Rydb.).
Mertensia picta Rydb. (Colo. only.)
M. parryi Rydb. (Colo. only.)
M. canescens Rydb. (Colo. only.)
Castilleja haydeni (A. Gray). (Colo. and N. M.)
Erigeron melanocephalus A. Nels.
Achillea alpicola Rydb.
Senecio invenustus Greene. (Colo. only.)
S. lapathifolium Greene. (Colo. only.)

Thus a restricted vertical range goes with a restricted latitudinal one as might be expected. *Castilleja haydeni* is exceedingly abundant just above timber line on the Sangre de Cristo range.

Species not Reported above 12,500 Feet but going below 11,000

(1) Species not reported below 8000 feet.

(*a*) Species which extend to British America or Alaska (31 species):—

Picea engelmanni (Parry).
Abies lasiocarpa (Hooker).
Trisetum majus (Vasey).
Poa leptocoma Bong.
Salix chlorophylla Anders.
Polygonum montanum (Small).
Alsine lœta (Richards).
Cerastium beeringianum C. & S.
Mœhringia macrophylla (Hooker).
Caltha leptosepala Hooker.
Aconitum columbianum Nutt.
Pectianthia pentandra (Hooker).
Micranthes arguta (D. Don).
Potentilla pinnatisecta (S. Wats.).
Erythrocoma ciliata (Pursh).
Pyrola asarifolia Mx.

Vaccinium cœspitosum Mx.
V. poreohilum Rydb.
V. erythrococcum Rydb.
Chondrophylla americana (Engelm.).
Phacelia ciliosa Rydb.
Mimulus langsdorfii Sims.
Veronica wormskjoldii R. & S. (Goes above timber line in New Mexico.)
Castilleja lancifolia Rydb.
Elephantella grœnlandica (Retz.).
Pedicularis racemosa Dougl.
P. bracteata Benth.
Aster apricus (A. Gray).
Erigeron salsuginosus (Rich.).
Hieracium gracile Hooker.
Agoseris gracilens (A. Gray).

(*b*) Species confined to the United States, or not extending north of the British Boundary (71 species):—

Pinus aristata Engelm.
Stipa minor (Vasey).
Poa sheldonii Vasey. (Colo. only.)
Festuca minutiflora Rydb.
F. thurberi Vasey.
Carex melanocephala Turcz.
C. scopulorum Holm. (Colo. only.)
Anticlea coloradensis Rydb.
Polygonum commixtum Greene.
Oreobroma pygmœa (A. Gray).
Cerastium earlei Rydb. (Colo. only.)
C. occidentale Greene.
Trollius albiflorus (A. Gray).
Aquilegia saximontana Rydb. (Colo. only.)
Aconitum bakeri Greene.
Ranunculus unguiculatus Greene. (Colo. only.)
R. alismœfolius Geyer.
R. macauleyi A. Gray. (Colo. only.)
R. alpeophilus A. Nels.
R. adoneus A. Gray.
Thlaspi nuttallii Rydb.
Smelowskia americana Rydb.
Pentstemon glaucus Graham.
Castilleja lauta A. Nels.
C. linearis Rydb. (Colo. only.)
C. puberula Rydb. (Colo. only.)
Pedicularis parryi A. Gray.
Campanula parryi A. Gray.
Macronema discoideum Nutt.
Aster fremontii A. Gray.
Draba crassa Rydb.
D. spectabilis Greene.
D. luteola Greene. (Colo. only.)
Micranthes arnoglossa (Greene).
Ribes lentum (Jones).
Lupinus parviflorus Nutt.
Trifolium brandegei S. Wats. (Colo. only.)
T. stenolobum Rydb. (Colo. only.)
T. lividum Rydb.[1]
Geranium pattersonii Rydb. (Colo. only.)
Viola bellidifolia Greene.
Oreoxis alpina (A. Gray).
Ligusticum porteri C. & R.
Pseudocymopterus montanus (A. Gray).
P. sylvaticus A. Nels.
Androsace subumbellata (A. Nels.).
Anthopogon barbellatus (Engelm.). (Colo. only.)
Amarella monantha (A. Nels.). (Colo. only.)
A. scopulorum Greene.
A. plebeja holmii (Wettst.).

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[1] *Trifolium lividum* is given by Rydberg as extending to 12,000 feet; my wife found it on Arapahoe Peak about timber line.

Dasystephana parryi (Engelm.).[1]
Phlox kelseyi Britton.
Polemonium delicatum Rydb. (Colo., N. M.)
Mertensia polyphylla Greene.
Erigeron leucotrichus Rydb.
E. leiomerus A. Gray.
E. elatior A. Gray.
E. coulteri Porter.
E. salsuginosus glacialis (Nutt.).
E. viscidus Rydb. (Colo. only.)
Antennaria nardina Greene.
Arnica silvatica Greene.
A. rydbergii Greene.
A. tenuis Rydb.
A. subplumosa Greene.
Senecio pagosanus Heller. (Colo. only.)
S. blitoides Greene. (Colo. only.)
S. pentodontus Greene.
Carduus scopulorum Greene. (Colo. only.)
C. griseus Rydb. (Colo. only.)
Agoseris pumila (Nutt.).

To these may be added the two following:—

Mertensia perplexa Rydb. Arapahoe Peak, Colo., in a draw just above timber line (*W. P. Cockerell*).

Senecio triangularis Hooker. Arapahoe Peak, at timber line (*Dr. F. Daniels* and *W. P. Cockerell*).

(2) Species going below 8000 feet. In the case of some of these, the range to 12,000 feet may need confirmation. It is not impossible that misunderstandings have sometimes arisen, as the result of vague labeling.

(*a*) Species extending to British America or Alaska (24 species):—

Equisetum lævigatum A. Br.
Calamagrostis purpurascens R. Br. (To Greenland.)
Festuca ingrata (Hack.).
Agropyron violaceum (Hornem.). (To Greenland.)
Carex ebenea Rydb.
Anticlea elegans (Pursh).
Eriogonum flavum Nutt.
Anemone globosa Nutt.
Ranunculus ellipticus Greene.
Thalictrum venulosum Trelease.
Sedum stenopetalum Pursh. (But really goes higher than Rydberg reports.)
Ribes parvulum (A. Gray).
Lepargyræa canadensis (L.).
Osmorrhiza obtusa (C. & R.). (*Washingtonia obtusa* C. & R.)
Androsace puberulenta Rydb.
Amarella strictiflora (Rydb.).
Dasystephana affinis (Griseb.).
Veronica americana Schwein.
Campanula petiolata D. C.
Erigeron multiflorus Rydb.
E. glabellus Nutt.
Antennaria aprica Greene.
Achillea lanulosa Nutt.
Lygodesmia juncea (Pursh).

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[1] Mixed with this according to Greene, is a second species, *Dasystephana bracteosa* (*Gentiana bracteosa* Greene, *Pitt.*, vol. 4, 180.)

The Campanula and Achillea are offshoots from Old World types, and were until recently considered identical with them.

(*b*) Species not going north of the British Boundary (32 species):—

Blepharineuron tricholepis (Torrey). (To Mexico.)
Poa longipedunculata Scribn.
P. praticola Rydb. & Nash.
P. buckleyana Nash.
Eriogonum umbellatum Torrey.
Cerastium pilosum Greene. (Colo. only.)
C. oreophilum Greene. (To California.)
Arenaria confusa Rydb.
Silene hallii S. Wats.
Aquilegia cærulea James.
Erysimum wheeleri S. Wats.
Heuchera hallii A. Gray. (Colo. only.)
Micranthes rhombifolia (Greene).
Ribes wolfii Rothr.
Drymocallis fissa (Nutt.).
Viola canadensis neomexicana (Greene).
Gayophytum racemosum T. & G.
Polemonium brandegei (A. Gray). (Colo. only.)
Phacelia alpina Rydb.
Mertensia pratensis Heller.
M. viridula Rydb. (Colo. only.)
Besseya ritteriana (Eastw.). (Colo. only.)
Sambucus microbotrys Rydb.
Chrysopsis arida A. Nels.
Oreochrysum parryi A. Gray.
Erigeron glandulosus Porter.
E. superbus Greene. (Colo. only.)
Dugaldia hoopesii (A. Gray).
Arnica monocephala Rydb.
Senecio pudicus Greene. (Colo. only.)
Carduus oreophilus Rydb. (Colo. only.)
Agoseris agrestis Osterh. (Colo. only.)

Taking the whole list of species which reach 12,000 feet, arranged in systematic order, we note many points of interest.

(1) There is only one fern, a circumpolar species.

(2) The grasses number 33, of which four are circumpolar, but others are very close to Old-World types. There is an appreciable element of endemic alpine grasses.

(3) The Cyperaceæ number 20, of which 11 reach the Old World. All but one (Elyna) belong to Carex.

(4) Of the four Juncaceæ, two are circumpolar. For a very interesting account of the allies of *Juncoides spicatum* in Africa, see Engler in *Ann. Bot.*, Oct., 1904.

(5) In Portulacaceæ, the peculiar alpine *Claytonia megarrhiza* is noteworthy. It belongs to a distinct subgenus which ranges from Asia into our Rocky Mountains.

(6) The Alsinaceæ are numerous (18 species); one (*Sagina*

nivalis) is circumpolar. *Alsine baicalensis* appears to have a singular distribution; north to Montana and Oregon only, and then reappearing in Central Asia. It may be that the identity of the Asiatic and American plants needs confirmation. *Alsine læta* is supposed to reach Siberia, though Rydberg says nothing of its ranging beyond our continent.

(7) The Ranunculaceæ are well represented (21 species), but are mostly of the Hudsonian Zone rather than the Arctic-Alpine; 16 do not range above 12,000 feet.

(8) The Cruciferæ are represented by Thlaspi (4), Smelowskia (2), Erysimum (4), and Draba (13). Only *Draba aurea* appears to be circumpolar.

(9) The Rosaceæ include as many as 9 species of Potentilla. Of the 14 species of this family, only 3 fail to go above 12,500 feet.

(10) The Leguminosæ include no circumpolar types, and only one reaches British America; 7 out of the 9 belong to Trifolium.

(11) The Epilobiaceæ number only 3; *Chamænerion angustifolium* (L.) should probably be added, as my wife found a reduced form of it above timber line on the Truchas Peaks in New Mexico.

(12) Of the 8 Umbelliferæ none is circumpolar, and only one appears to reach British America.

(13) Of the 6 Pyrolaceæ, four are circumpolar, and a fifth reaches Japan. The species of Pyrola exhibit a remarkable degree of stability.

(14) No Ericaceæ, in the restricted sense, are in the list, but I believe *Kalmia microphylla* (Hooker) should be there.

(15) The Gentianaceæ number 12; while only one is supposed to extend to the Old World, others are very close to Asiatic and European species. *Anthopogon elegans* was formerly not separated from *Anthopogon dentosus* (*Gentiana dentosa* Rottb.). *Amarella monantha* was considered by Gray inseparable from *Amarella tenella* (*Gentiana tenella* Rottb.). *Amarella strictiflora* was considered a form of *Amarella amarella* (*Gentiana amarella* L.). *Chondrophylla fremontii* was referred to *Chondrophylla humilis* (*Gentiana humilis* Stev.). *Dasystephana romanzovii* was not separated from *Dasystephana frigida* (*Gentiana frigida* Haenke) The species of Swertia were included in *S. perennis* L.

(16) The Polemoniaceæ consist of four species of Phlox,

two of Gilia, and six of Polemonium. Not one reaches the Old World, or even, apparently, British America.

(17) The Boraginaceæ include two species of Eritrichium and ten of Mertensia; all peculiar to the western United States but closely allied to arctic species.

(18) Of the 23 Scrophulariaceæ, nine reach British America (two even Greenland), but none is circumpolar. *Veronica wormskjoldii,* however, is a slightly modified form of the type represented in Europe by *V. alpina* L. *Veronica serpyllifolia* L., a truly circumpolar species, occurs in Colorado only up to 11,000 feet, according to Rydberg. I found it on the top of the Las Vegas Range in New Mexico, at 11,000 feet, June 28, 1902. The plants were, however, divergent from typical *serpyllifolia,* representing a new variety or subspecies *neomexicana,* about 15 cm. high, puberulent, flowers deep blue, calyx lobes oblong, obtuse.

(19) *Linnæa americana* and *Campanula petiolata* are only slightly modified representatives of Old-World types.

(20) The Compositæ are very numerous, 79 species. The two largest genera are Erigeron (14 species) and Senecio (24 species). Carduus has 5, Arnica 6, Artemisia 4, Antennaria 6, Aster 4, Solidago 2. These are circumpolar genera; but there are some endemic genera, partly of austral derivation, the most remarkable of which is Rydbergia.

(21) The following families, represented in the Colorado flora, are wholly absent from our list of species reaching 12,000 feet.

Marsileaceæ (7720).
Isoëtaceæ (8150).
Lycopodiaceæ (10,500).
Juniperaceæ (10,000).
Ephedraceæ (7000).
Typhaceæ (6000).
Sparganiaceæ (11,500).
Zanichelliaceæ (11,500).
Naiadaceæ (5100).
Scheuchzeriaceæ (10,000).
Alismaceæ (9000).
Elodiaceæ (6500).
Araceæ (4500).
Commelinaceæ (6500).
Pontederiaceæ (5500).
Dracænaceæ (8000).[1]
Calochortaceæ (10,000).
Trilliaceæ (9000).
Smilacaceæ (6000).
Ixiaceæ (10,000).
Orchidaceæ (11,500).
Monotropaceæ (8000).

[1] Rydberg gives *Yucca glauca* as only reaching 6000 feet; this is erroneous, as it reaches 8000 at Florissant and elsewhere. Rydberg's maximun for the family is 6500.

Ericaceæ (11,000).
Oleaceæ (5000).
Menyanthaceæ (8000).
Heliotropaceæ (4800).
Verbenaceæ (7500).
Labiatæ (Lamiaceæ) (10,000).
Solanaceæ (10,000).
Betulaceæ (11,000).
Corylaceæ (8000).
Fagaceæ (11,000).[1]
Urticaceæ (9000).
Cannabinaceæ (8000).
Ulmaceæ (6000).
Loranthaceæ (8850).
Santalaceæ (8000).
Chenopodiaceæ (10,000).
Amaranthaceæ (10,000).
Allioniaceæ (9000).
Tetragoniaceæ (8000).
Ceratophyllaceæ (Platte River).
Nymphæaceæ (11,000).
Berberidaceæ (10,000).
Fumariaceæ (10,000).
Capparidaceæ (9000).
Parnassiaceæ (11,000).
Hydrangeaceæ (10,000).
Malaceæ (11,000).
Amygdalaceæ (9500).
Mimosaceæ (3920).
Cassiaceæ (7000).
Apocynaceæ (9500).
Asclepiadaceæ (9000).
Cuscutaceæ (7000).
Convolvulaceæ (7000).
Orobanchaceæ (11,000).
Martyniaceæ (5340).
Plantaginaceæ (10,000).
Linaceæ (10,000).
Oxalidaceæ (9000).
Zygophyllaceæ (5340).
Rutaceæ (5400).
Polygalaceæ (5000).
Euphorbiaceæ (8000).
Callitrichaceæ (5340).
Limnanthaceæ (6500).
Spondiaceæ (8000).
Celastraceæ (10,000).
Aceraceæ (9000).
Frangulaceæ (9000).
Vitaceæ (9000).
Elatinaceæ (Platte River).
Frankeniaceæ (5340).
Hypericaceæ (10,000).
Cistaceæ (Douglas County).
Loasaceæ (10,000).
Cactaceæ (11,000).
Lythraceæ (6000).
Gunneraceæ (10,000).
Hederaceæ (9000).
Cornaceæ (10,000).
Rubiaceæ (10,000).
Cucurbitaceæ (5100).
Lobeliaceæ (5200).
Ambrosiaceæ (8000).

The numbers following the family names indicate the highest altitude in feet to which the families ascend in Colorado according to the data given by Rydberg.

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[1] *Quercus nitescens* Rydb., 11,000. This is very high for an oak. Although oaks are so abundant at Manitou, we found none at Florissant, 8000 feet. They go higher, however, in the Sangre de Cristo range.